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Description of a new Genus and two new Species of Blind Freshwater Amphipods from Western Australia,

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In the collection of freshwater Amphipods which has accumulated as one result of a number of trips made into different parts of this State, are a number of specimens taken at many localities, closely akin to the form recently described by Chilton in this Journal, and named by him *Neoniphargus westralis*, (1925).

The specimens which Chilton examined were some which had been taken by myself, early in the winter of 1922, from a small spring in a valley just immediately east of Darlington Railway Station. In the first instance they were sent to Dr. Calman of the British Museum by Mr. Glauert, to whom I had submitted the specimens for identification. As Dr. Chilton notes, these specimens were returned to Perth and forwarded to him in 1923*.

These first specimens were white in colour and slightly translucent in life, rarely with faint traces of vestigial eyes occurring immediately behind the base of the first antenna; in preserved specimens these vestiges are no longer to be made out.

Specimens obtained later, from other creeks emptying into the Helena River below Darlington, as well as from springs and creeks discharging into the Mundaring Reservoir, while closely resembling in many points, the bleached specimens first obtained, differed visibly in colour, varying from brownish yellow to pink. In these,

* The small collection was supplemented, as I learn from Mr. Glauert, by specimens which the latter had himself collected in the meantime.

however, the eyes though obviously much reduced were clearly visible in life as pinkish white patches of variable shape and size.

From a dam at Katanning a few specimens were obtained of gray green colour, apparently eyeless but with some of the appendages remarkably setose.

Recently, when Dr. Chilton's paper came into my hands, I turned out my material in order to label it and I was then impressed with the obvious differences exhibited by the Katanning specimens. Further investigation showed that the coloured specimens from Darlington and Mundaring were, also, unlike in quite important characters the description given of *N. westralis* by Chilton. For the purpose of confirmation, some fresh material was obtained and examined in the living condition and it appeared evident that the Darlington material comprised two distinct but closely related species both akin to the darker specimens from Katanning.

Chilton, while assigning his new species provisionally to *Neoniphargus*, notes that in a number of points it departed from the condition shown by all of the Eastern Australian and Tasmanian forms, referred to this genus.

The two new forms, to be described below, differ in precisely the same way in respect to these same characters as well as in certain others not recorded for *N. westralis*. Accordingly I have decided to separate the three species in a new genus for which I propose the name *Uroctena*, having reference to the remarkable and distinctive comb-like seta-bearing plate on the proximal joint of the third uropod of the male.

UROCTENA gen. nov.

Near to *Neoniphargus* (?) but with Antenna 2 in the male very stout and almost pediform; side plates not very deep, fourth little excavated behind, with gnathopod 2 much larger than gnathopod 1, particularly in the male; accessory gills on several peraeon segments. Uropod 3 with peduncle broad, inner ramus small; outer ramus moderately elongated, 2-jointed; in the male, proximal end of first joint produced into a flange-like projection set with numerous stout setae, forming a comb-like structure.

With three species:—

U. affinis sp. nov. (sp. typ.).
U. setosa sp. nov.
U. westralis (Chilton), *Neoniphargus w.*, Chilton Journ. Roy. Soc. W.A., Vol. 11, p. 81-84, 1925.

U. setosa sp. nov. (Pl. XII, Figs. 1-6 and Pl. XIII, Figs. 7-9).

Specific diagnosis:—Segments of the urus with a few delicate setae. Eyes absent. Antenna 1 rather less than half the length of the body. Antennae 2 very stout; in the male almost pediform, extremely setose; moderate in the female; gnathopod 2 much larger than gnathopod 1 in the male and, to a lesser degree, in the female; without spinous rows on second joint but very setose on next four joints; carpus triangular with distal lobe well developed, propod oval, palm shorter and less oblique than in *U. westralis* with irregular lobing little developed. Uropod 3, with basal joint broad, outer ramus moderately elongated, two-jointed; the proximal joint bearing, in the male, a narrow flange-like expansion set with long setules. Telson as wide as long, cleft slightly more than half its length.

Length.—All much curved but, measured along the mid-dorsal line, largest male, 9 mm., largest female, 7.5 mm.

Colour.—In life, grayish green; in spirit, dull brown.

Habitat.—Amongst *Chara sp.* growing near edge of a large reservoir at Katanning. Eighteen specimens were taken, of which four were females with well developed brood pouch; one large and eight smaller males; five were immature.

Detailed description:—The first antenna is slightly stouter in the male than in the female, having a flagellum (26 joints in the large male examined) 1¾ the length of the peduncle; in the female, the flagellum (24 joints) is exactly double the length of the peduncle but in neither is it very setose. The accessory flagellum, in both sexes, is 4-jointed and equals in length, approximately, the first four articles of the primary flagellum.

The second antenna is, in the female, (Pl. XII, Fig. 2) markedly setose; in the male (Pl. XII, Fig. 1) it is extremely so; in the latter, also, it is very much stouter than in the female and the flagellum (of ten joints) is distinctly shorter than the combined length of the two more distal joints of the peduncle. The width of the second joint of the peduncle is equal almost to half the length of the flagellum. From a comparison with the figures given by Chilton of *U. westralis* it will be evident that the flagellum in that species is, relatively, even shorter still. In the female the two more distal joints of the peduncle (which is not disproportionately stout) are scarcely longer than the

flagellum; as a whole the appendage (in the female) is more slender than the first antenna of the male, whereas in *U. westralis* this does not appear to be the case (Chilton, 1925, Figs. 2a & 3a).

In the peraeon the side plates are relatively short with the inferior margin rounded and closely set with long setae which appear to be much more numerous than in *U. westralis*. The first gnathopod of the female (Pl. XII, Fig. 6) as compared with the second gnathopod, has the carpus considerably longer, but not so distinctly widened distally, and the propod smaller. In the male (Pl. XII, Fig. 3) the first gnathopod seems not to differ very markedly from that of *U. westralis*. The second gnathopod of the female (Pl. XII, Fig. 5) agrees quite closely with that of *U. westralis* except that the basos of the former is relatively shorter and stouter and the limb as a whole immensely more setose. A very large marsupial plate, a large branchia and a small simple accessory branchia are found related to the basal joint of this limb. In the male (Pl. XII, Fig. 4) this appendage exhibits a number of minor differences in the several joints from the corresponding structures in *U. westralis*, the meros of the appendage being relatively shorter and broader, the carpus much less evidently triangular in outline, the propod more nearly oval, the dactyl longer and not so strongly curved. There is no extension of the palmar edge beyond the tip of the dactyl such as Chilton shows for *U. westralis*. The outstanding difference, however, is due to the remarkable development of long setae, arranged in bunches upon the terminal joints.

A largely developed setosity is shown in some others of the freshwater Amphipoda recorded from Eastern Australia, as in *Atyloides gabrieli* and *Gammarus australis* (Sayce 1901) but in none of these does it attain such an extreme development as in this Western Australian form. The sexual difference noted by Chilton (1925) in the third uropod of *U. westralis* is equally well marked in *U. setosa* (Pl. XIII, Fig. 7-8) the male alone bearing upon the distal end of the outer ramus a comb-like plate with 12-14 stiff setae. In its proportions, as compared with the third uropod of *U. westralis*, the peduncle is, perhaps, slightly larger, and is as broad as long, whereas in *U. westralis* the breadth is much greater than the length; both rami being relatively shorter. The inner ramus is smaller generally, the outer less than twice the length of the peduncle, with the distal joint quite half the length of the proximal. The telson (Pl. XIII, Fig 9) is as broad as long and cleft scarcely more than half its length, the two portions bearing, sub-apically, two or three spines and several longer and more slender setae, in which arrangement it differs from the other species of this genus.

U. affinis, sp. nov. (Pl. XIII, Figs. 10-15).

Specific Diagnosis.—All the pleon segments except the last with at least a pair of dorsal or dorso-lateral setules; fourth and fifth segments with two and three pairs respectively.

Somewhat degenerate eyes distinctly to be made out in life, not readily to be observed in specimens preserved in spirits. Antenna 1 about half the length of body, accessory flagellum 4-6 joints. Antenna 2 not so stout as in *U. westralis,* 10 jointed flagellum relatively shorter and more slender with an olfactory cylinder on the penultimate joint.

Gnathopod 2 larger than gnathopod 1. Upon the inner aspect of the basos of this limb is a series of four transverse ridges each bearing from three to five stout spines. Distal lobe upon carpus well developed, propod oval, oblique palm separated only from convex posterior border of the joint by a triangular projection bearing two stout spines between which the tip of the dactyl is received; accessory gills considerably branched are found on some of the appendages of the peraeon. Uropod 3 with basal joint nearly as long as broad; inner ramus small, outer two jointed; comb-like plate on proximal joint, bearing from 18-21 stiff, closely-set setae; terminal joint as long as inner ramus and less than one fourth the length of entire appendage. Telson, cleft almost to the base, three-fourths as long as broad and equal to length of proximal joint of third uropod; a small basal portion curved into a shallow hood-like piece continuing the dorsal surface of pleon from which the cleft portion projects at a sharp angle.

Length.—Not exceeding 9 mm.

Colour.—In life yellow brown, somewhat translucent, chalk-white eyes sometimes appearing faintly pink tinted; in females the ovary is discernable through the body wall and gives a faintly pink tint which is much more noticeable when the brood pouch is filled with large eggs of salmon pink colour.

Habitat.—Found abundantly near the origins of many small springs around Darlington and Mundaring; usually hiding under decaying vegetable matter or actually burrowing in the sandy or gravelly soil beneath the flowing water.

Remarks.—U. affinis may be distinguished from *U. westralis,* to which it is closely related, by its distinctive colour, and the presence of degenerate eyes. It appears to differ from that species also in the slightly more slender second antenna (Pl. XIII, Fig. 13-14), and telson (Pl. XIII, Fig. 15).

I had at first supposed that the armature of spines upon the inner surfaces of the basos of the second gnathopod (Pl. XIII, Fig. 12) was a distinctive character, as it was not mentioned by Chilton as occurring in *U. westralis*. I find, however, that it is present in that species also, but is absent in *U. setosa*. Of these three species, all of which are obviously closely related, *U. affinis* may be regarded as the least modified, still continuing to lead a life in more or less open water. The water courses it inhabits are, however, quite liable to dry up, and a habit of burrowing has been formed resulting, in the course of time, in the partial obsolescence of the eyes. It is highly probable that in more permanent waters a still less modified form yet remains to be discovered in which the eyes are well developed and functional.

Uroctena westralis, judging from its bleached appearance and practically eyeless state, is a truly subterranean form probably derived from *U. affinis* and found at the surface now, only when washed up by the stronger flowing of the springs in exceptionally wet weather. *U. setosa* apparently leading a life in surface water, at the present time, is remarkable for the striking development of the setae which are presumably sensory. It is to be regarded as a blind species becoming readapted to surface conditions and may be supposed to have been derived directly from a surface living form rather than from *U. affinis*, lacking as it does the armature of spines on the basos of the second gnathopod. It would appear that the genus has its closest affinities with *Neoniphargus* but has become modified as a result of adaption to burrowing habits and subterranean life. It is noteworthy, however, that in the Victorian species, *Neoniphargus obrieni*, we have a form practically blind which has nevertheless departed very little from the typical Neoniphargid condition.

In the remarkable sex distinction which *Uroctena* exhibits and also in the condition of its mouth parts, there is shown a wide divergence from all existing species of *Neoniphargus*. The mouth parts, indeed, seem to resemble more nearly those of *Niphargus*, to which genus there are resemblances, also, in the elongation of the carpus of the gnathopods and the shallowness of the side plates.

The members of the genus lack, moreover, the dactylar sensory seta, which is so constant a feature in *Neoniphargus*. In *U. setosa*, this is found, in a little developed state, on one appendage only, the second peraeopod.

It is of interest that no fewer than five species of blind Amphipods and Isopods are now known from Western Australia; this number will almost certainly be considerably increased as our knowledge is extended for, in a country such as this, with

so little permanently standing fresh water, many aquatic forms could survive as such, only by having recourse to the habit of burrowing and remaining underground in subterranean moisture throughout the long dry season.

LIST OF REFERENCES.

1925 Chilton, Chas., Journ. Roy. Soc. W.A., Vol. 11, 1925.
1924 Nicholls, G. E., Journ. Roy. Soc. W.A., Vol. 10, 1924.
1926 Nicholls, G. E., Journ. Roy. Soc. W.A., Vol. 12, 1926, in the press.
1901 Sayce, O. A., Proc. Roy. Soc. Vic., Vol. 13, 1901.

EXPLANATION OF PLATES.

PLATE XII.

(All figures of *Uroctena setosa*)

Fig. 1 First Antenna, male.
Fig. 2 First Antenna, female.
Fig. 3 First Gnathopod, male.
Fig. 4 Second Gnathopod, male.
Fig. 5 Second Gnathopod, female.
Fig. 6 First Gnathopod, female.

PLATE XIII.

Fig. 7 *U. setosa*, third uropod, female.
Fig. 8 *U. setosa*, third uropod, male.
Fig. 9 *U. setosa*, telson,
Fig. 10 *U. affinis*, first antenna, male.
Fig. 11 *U. affinis*, first gnathopod, male.
Fig. 12 *U. affinis*, second gnathopod, male.
Fig. 13 *U. affinis*, third uropod, male, inner view.
Fig. 14 *U. affinis*, third uropod, male, lateral view.
Fig. 15 *U. affinis*, telson.

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